GRASSES
Native and Non-native Species in the Great Basin

LEMMON'S ALKALIGRASS

A tufted, perennial grass native to the sagebrush steppe in the western United States. Lemmon's alkaligrass is often found in alkaline areas of the Great Basin region.

BENTGRASS

The genus *Agrostis* (L.) includes many species of bentgrass, are usually perennial, often occurring on hydric soils' there are over 100 species worldwide. Some of the introduced species as colonial bentgrass and creeping bentgrass are important turf grasses. A common grass found in meadows or along streams, redtop (*A. alba*), probably originated from European seed sources.

About twenty bentgrass species are native to the USA. Several species, including spike bentgrass (*A. exarata*) and Oregon bentgrass (*A. oregonensis*), are native to meadows, riparian areas and wetlands in the western USA. Conservation drill seeding rate for bentgrasses, depending on the species, is usually two pounds, pure live seed (PLS), per acre. Bentgrass species may average up to 5,000,000 seeds per pound.

BLUEGRASS

BIG BLUEGRASS (*Poa secunda J. Presl*) (Also known as *Poa ampla*)
A long-lived, native bunchgrass, up to 24 inches in height at maturity, found throughout the temperate continental climate of the western USA. Big bluegrass is a component of the sagebrush-steppe and Palouse prairie plant communities. Soils: It occurs on loam to silt-loam soils where the mean annual precipitation is nine to 16 inches. It is often used as early spring forage, but is easily destroyed by overgrazing in the spring. It is utilized by many wildlife species. Big bluegrass competes well with winter annual weeds such as cheatgrass (*Bromus tectorum*). It is a component of sage-grouse habitat.
Cultivars/Varieties: 'Sherman' is the only released big bluegrass cultivar (USDA-NRCS, Pullman, Washington). It was originally collected from a native sagebrush-grass plant community in Sherman County, Oregon. It has been used for herbage production, erosion control, and native plant community diversity. Seeding recommendation: seed shallow in the soil, late fall or early spring with adequate moisture.
Ecoregions: Columbia Plateau, Blue Mountains, Snake River Plain, and portions of the Northern Basin and Range.
Average number of seeds per pound: 917,000. 21 seeds/sq.ft./lb/acre.
Drill seeding rate: four pounds per acre, seeded as a single species; one to two pounds per acre in a mix; seed ¼ inch into soil.

BOG BLUEGRASS (*Poa leptocoma Trin.*)
A native perennial grass that is indigenous to hydric soils in meadows, pond margins, and along streams. It naturally occurs from Alaska to northern California, east to New Mexico and Colorado; usually found at middle to high elevations. Bog bluegrass requires at least thirty inches of mean annual precipitation for establishment and survival. Not to be confused with fowl bluegrass (*P. palustris*), an introduced invasive bluegrass sometimes found in wetlands and adjacent sites.

CANADA BLUEGRASS (*Poa compressa* L.)
A low-growing bluegrass, with short rhizomes, that occurs from Newfoundland, Canada to Alaska, south to the northern States. Canada bluegrass has some shade tolerance, and tolerance of low soil fertility tolerance and moderate soil acidity. It has been used as a low maintenance groundcover and soil stabilizer for roadsides, ditch banks, cover between trees, recreation areas, and borrow pits. It needs a minimum of 18 inches of mean annual precipitation. **Cultivars/Varieties**: 'Reubens' Canada bluegrass is an introduced commercially available cultivar.
Average number of seeds per pound: 2,500,000. 57 seeds/sq.ft./lb/acre.
Drill seeding rate: four pounds per acre.

CANBY'S BLUEGRASS [#1] (*Poa secunda* J. Presl) (Formerly: *Poa canbyi*)
A long-lived, low-growing bunchgrass native to rangelands and shrub-grasslands of northwestern USA. Canby's bluegrass is vernal dominant and adapted to short season moisture sites. It is used as an understory grass for erosion control and herbage production. Soils: It occurs on sites with silt-loam soils that receive nine to twenty inches mean annual precipitation. It greens up in the early spring and low herbage production. Canby's bluegrass is drought tolerant, actually drought-escaping by going dormant usually by June 1. Ecoregions: Portions of the Columbia Plateau and Blue Mountains. **Cultivars/Varieties**: 'Canbar' Canby's bluegrass is a cultivar released by USDA-NRCS, Pullman, Washington. Canbar was originally collected from a foothills site in the Blue Mountains, Oregon. It has good vigor and seed production adapted to the interior Pacific Northwest. Canby bluegrass is not seeded as a single species in BLM projects.
Average number of seeds per pound: 930,000. 21.2 seeds/sq.ft./lb/acre.
Drill seeding rate: one to two pounds per acre in a seed mixture.

CUSICK'S BLUEGRASS (*Poa fendleriana* ssp. *fendleriana* [Steud.] Vasey)
A native perennial bluegrass found on dry to rocky slopes at middle to high elevations, from British Columbia, Canada to central California and east to North Dakota, Wyoming, and Colorado. Cusick's bluegrass naturally occurs on silt loam to sandy loam soils; eight to 20 inches mean annual precipitation. It is a highly valued grass for herbage production for certain wildlife species and domestic livestock. It has been used for soil erosion control and soil stabilization. Ecoregions: Columbia Plateau and Blue Mountains.
Average number of seeds per pound: 890,000. 20.4 seeds/sq.ft./lb/acre.
Drill seeding rate: four pounds when seeded singly, one to two pounds in a seed mixture.

KENTUCKY BLUEGRASS (*Poa pratensis* L.)
A major lawn and turf grass, non-native, introduced from Europe, adapted to cool climates and moist growing conditions. Kentucky bluegrass usually has low herbage

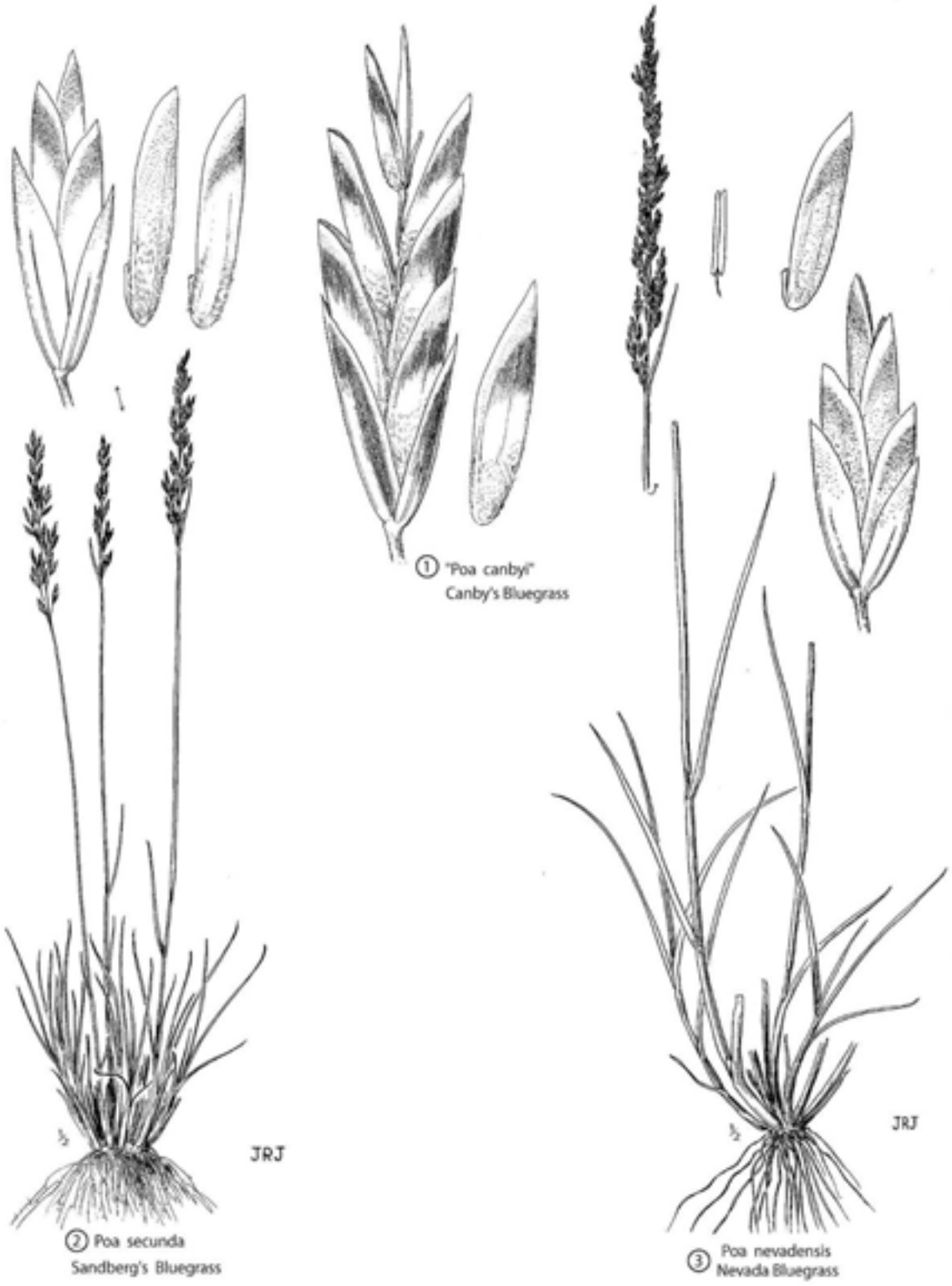
production. It may persist and out-compete other desired species in middle to high elevation meadows and along stream banks. *Do not use Kentucky bluegrass in conservation or restoration plantings in riparian areas or adjacent to wetlands and meadows since it is invasive on those sites.* It requires a minimum of 18 inches of mean annual precipitation, or equivalent irrigation or runoff.
Average number of seeds per pound: 2,150,000. 50 seeds/sq.ft./lb/acre.

MUTTONGRASS (*Poa fendleriana* [Steud.] Vasey)
A native perennial found in sagebrush-steppe to wooded areas at middle elevations in the Intermountain western states. Muttongrass naturally occurs from eastern Washington to California and east through the Rocky Mountain States to New Mexico. It is closely related to Cusick's bluegrass. Muttongrass requires at least 12 inches mean annual precipitation. Ecoregions: Blue Mountains, Wasatch Mountains, Middle Rocky Mountains, and Northern Rocky Mountains. Drill seeding rate: one to two pounds per acre in a seed mixture.

SANDBERG'S BLUEGRASS [#2] (*Poa secunda* J. Presl)
A long-lived, low-growing bunchgrass native to sagebrush-grass plant communities of the western USA and Canada. Sandberg's bluegrass is vernal dominant and adapted to short season moisture sites at low to middle elevations on silt loam to deep loam soils. It is used as an understory grass for erosion control, herbage production, and native species diversity on sites that receive seven to 18 inches mean annual precipitation. Sandberg's bluegrass greens up early in the spring. It is drought tolerant, actually drought-escaping by going dormant before mid-June until the fall rains may begin plant regrowth in September. It is an important component of sage-grouse habitat. Ecoregions: Columbia Basin, Snake River Plain, Blue Mountains, Eastern Cascades, Northern Basin and Range, Central Basin and Range. **Cultivars/Varieties**: The US Forest Service Shrub Sciences Lab is planning to release a prevarietal native germplasm, Mountain Home Sandberg's bluegrass. Source-identified seed is available from commercial seed vendors.
Average number of seeds per pound: 926,000. 21 seeds/sq.ft./lb/acre.
Drill seeding rate: one to two pounds/acre in seed mixture, seed shallow 1/8 to 1/4 inch.

Two other native western dry land bluegrasses may also be available for seeding:

NEVADA BLUEGRASS [#3] (*Poa nevadensis*) and **ALKALI BLUEGRASS** (*Poa juncifolia*). Recently for taxonomical purposes they have been included as subspecies of *Poa secunda*.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½
JRJ
② Poa secunda
Sandberg's Bluegrass
① "Poa canbyi"
Canby's Bluegrass
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③ Poa nevadensis
Nevada Bluegrass

BROMEGRASS

MEADOW BROME (*Bromus commutatus* Schrad.)
A perennial, weakly rhizomatous, non-native bromegrass, introduced from Turkey in western Asia. It has been used for pasture and hayland where the mean annual precipitation exceeds 16 inches, or equivalent irrigation. The leaves are mostly basal, long, lax, and softly pubescent. It does not go dormant under high summer temperatures as does smooth brome. *Do not use meadow brome in riparian areas or adjacent to wetlands and meadows*. **Cultivars/Varieties**: 'Regar' meadow brome (Eurasian seed source) was released by the USDA-NRCS, Aberdeen Plant Materials Center, Idaho.
Average number of seeds per pound: 93,000. 2.1 seeds/sq.ft./lb/acre.

MOUNTAIN BROME [#4] (*Bromus marginatus* Nees. ex Steud.)
A short-lived perennial, cool-season, native bunchgrass that rapidly develops to 24 to 26 inches in height. Mountain brome naturally occurs at middle to high elevations on moderately deep to deep loam soils in the western United States. It has moderately coarse culms and broad soft leaves, and has good herbage production. It does best on fertile and moist sites with a minimum of 16 inches of mean annual precipitation; but often does well on infertile, coarse, aridic soils. Mountain brome is tolerant of some soil salinity, shade tolerant, and good winter hardiness; but is intolerant of flooding.
Ecoregions: Columbia Plateau (Palouse Prairie), Northern Rocky Mountains, Middle Rocky Mountains, and Wasatch Mountains.
Cultivars/Varieties: 'Bromar' is a released cultivar of mountain brome from the USDA-NRCS, Pullman, Washington. It was originally collected from a natural stand in southwestern Montana. Bromar was selected for high herbage production with a good potential in crop rotations when mixed with legumes as a green manure crop. Maximum seed and herbage production is in the second growing season. It has also been used in soil stabilization seedings and especially useful for erosion control seedings after wildland fires. 'Garnet', recently released cultivar from Colorado, has improved resistance to head smut.
Average number of seeds per pound: 140,000. 3.2 seeds/sq.ft./lb/acre.
Drill seeding rate: 12 pounds per acre; seed about ½ inch into soil.

Other native bromegrasses in the western United States include: California brome (*Bromus carinatus*) and Columbia brome (*Bromus vulgaris*).

SMOOTH BROME (*Bromus inermis* Leyss.)
A highly variable, cool season, long-lived, sod-forming grass, non-native, introduced from Europe, may be invasive on some sites in the western USA. Smooth brome has been used for many years as forage on pasture and hay lands. It has also been used for erosion control in grassed waterways. A minimum of 16 inches of mean annual precipitation is required for establishment. *Do not use smooth brome in riparian areas, wetlands or meadows since it may be invasive in natural areas*. **Cultivars/Varieties**: 'Manchar' is a released cultivar from USDA-NRCS, Pullman, Washington. *'Lincoln' smooth brome is a cultivar used in the Midwestern states for livestock forage, not adapted to northern areas of the USA.*

Average number of seeds per pound: 125,000. 2.9 seeds/sq.ft./lb/acre.
Drill seeding rate for erosion control or forage: seven pounds per acre.

DROPSEED

DROPSEED, SAND [#5] (*Sporobolus cryptandrus* [Torr.] Gray)
A strongly tufted, perennial, warm-season grass, up to 32 inches tall at maturity. It is native to the sagebrush steppe and desert shrub communities on sandy to sandy loam soils in the interior western USA. Sand dropseed also occurs in grasslands and foothills with eight to 20 inches mean annual precipitation.
Average number of seeds per pound: 5,00,000. 115 eds/sq.ft./lb/acre.
Drill seeding rate: ½ to one pound per acre in a seed mix.

ALKALI SACATON (*Sporobolus airoides* [Torr.] Torr.)
A strongly tufted, perennial, warm-season grass, up to 40 inches tall at maturity. It is native to prairies, desert shrub lands, and mountain foothills, usually slightly to moderately moist, and especially characteristic of moderately alkaline soils in the interior western USA. Cultivar/variety: 'Salado' alkali sacaton was released by the USDA, NRCS Los Lunas New Mexico Plant Materials Center.
Average number of seeds per pound: 1,750,000. 40 seeds/sq.ft./lb/acre.

④ Mountain Brome

⑤ Sand Dropseed

FESCUE GRASS

CREEPING RED FESCUE (*Festuca rubra* L.)
A long-lived, low-growing, fine-leaved, competitive (but slow development) grass, with weak rhizomes. Creeping red fescue was introduced from Europe. It performs best on acidic soils with at least 18 inches of mean annual precipitation. It has been used for soil erosion control and soil stabilization on roadsides. **Cultivars/Varieties**: 'Fortress' and 'Illahee' are cultivars that have been seeded on harsh, acidic, infertile sites in western Oregon and Washington. Other cultivars are also commercially available. Average number of seeds per pound: 615,000. 14.1 seeds/sq.ft./lb/acre. Drill seeding rate: four pounds per acre.

HARD FESCUE (*Festuca trachyphylla* [Hack] Krajina)
A fine-leaved, low-growing, perennial, competitive (slow rate of establishment) bunchgrass adapted to well-drained sites where the mean annual precipitation exceeds 14 inches. Hard fescue, a non-native grass, was introduced from Europe. It has a dense and voluminous root system. It has been used for erosion control and soil stabilization on hillsides and highways. **Cultivars/Varieties**: 'Durar' is a cultivar released by the USDA Plant Materials Center, Pullman, Washington. Several other cultivars, including 'Aurora', have been seeded for a permanent cover crop in orchards and vineyards, and seeded for turf grass. Average number of seeds per pound: 565,000.
Thirteen seeds/sq.ft./lb/acre. Drill seeding rate: four pounds per acre.

IDAHO FESCUE [#6] (*Festuca idahoensis* Elmer)
A native, long-lived, cool season, perennial bunchgrass. Idaho fescue naturally occurs in sagebrush-grasslands, prairies, and meadows from British Columbia, Canada to northern California, and east to the Rocky Mountain States. It has fine, basal leaves with low annual seed production. It is slow to establish from seed and weak seedling vigor. The plants, including the mature seedhead, are ten to thirty inches in height. Soils: It does best on moderately deep to deep, fertile, silt loam to clay loam soils; it is tolerant of slightly saline, alkaline or acidic soil conditions. Idaho fescue thrives at 14 to 24 inches mean annual precipitation. Idaho fescue grows on some locations with north aspects on deep silt loam soil with ten inches of mean annual precipitation. It is moderately shade tolerant; plant crowns may be damaged or killed by fire, but it tolerates some fall burning when dormant. Idaho fescue has good spring herbage production; it is palatable to deer and elk, as well as domestic livestock. It is a component of sage-grouse habitat.
Ecoregions: Klamath Mountains, Eastern Cascades, Columbia Plateau (Palouse Prairie), Blue Mountains, Northern Rocky Mountains, and Idaho Batholith.
Cultivars/Varieties: 'Joseph' and 'Nezpurs' are Idaho fescue cultivars released by the University of Idaho, Moscow, Idaho. Winchester Idaho fescue was originally collected from a naturally occurring population in north central Idaho is also commercially available as a source-identified germplasm.
Average number of seeds per pound: 450,000. 10.3 seeds/sq.ft./lb/acre.
Drill seeding rate: four pounds per acre.

GREENLEAF FESCUE (*Festuca viridula* Vasey)
A perennial, native bunchgrass; broad-leaved grass. Greenleaf fescue naturally occurs in meadows and mountain slopes at middle to high elevations in the northwestern USA. Seeding rate: seven to eight pounds per acre.

ROEMER'S FESCUE (*Festuca roemeri* [Pavlick] Alexeev) (or *F. idahoensis* var. *roemeri*)
A perennial, native, fine-leaved bunchgrass that naturally occurs in meadows and prairies from southern British Columbia, Canada to northwestern California. Roemer's fescue is usually found as a component of prairie communities west of the Cascade Mountains, it is closely related to Idaho fescue. Soils: usually on deep silt loam with at least 24 inches mean annual precipitation. Ecoregions: Puget Lowland, Willamette Valley, and Klamath Mountains. **Cultivars**: source-identified seed from the Willamette Valley is available in limited quantities. Drill seeding rate: four to six pounds per acre.

SHEEP FESCUE (*Festuca ovina* L.)
A low-growing, fine-leaved, long-lived bunchgrass with basal leaf blades. Sheep fescue is more drought tolerant than other fine-leaved fescues. Soils: It does best on silt loam to loam soils with nine to 24 inches mean annual precipitation. Herbage production is low, but root growth is outstanding. Sheep fescue may take three to four years to establish on most sites. It is excellent for erosion control and soil stabilization, and is also seeded as an understory grass with taller vegetation. It has been successfully used for suppression, or competition, with many annual weeds; also seeded as a perennial cover crop in vineyards and orchards. **Cultivars/Varieties**: 'Covar' sheep fescue was released by the USDA-NRCS, Pullman, Washington. It was introduced from Turkey, western Asia. Covar is very short-statured, eight to 16 inches tall, the most drought tolerant cultivar currently available, and attractive bluish-green in leaf color. Other cultivars include 'Bighorn', a private release (Eurasian seed source) from Oregon that has been seeded as a perennial cover crop and turf grass in western Oregon. Blue fescue (*Festuca ovina* var. *glauca*) is an ornamental variety that has become popular in landscape projects. All sheep fescue cultivars currently available were developed or selected from foreign sources. Some botanists have identified populations of sheep fescue as native to specific areas of North America.
Average number of seeds per pound: 680,000. 15.6 seeds/sq.ft./lb/acre. Drill seeding rate: four pounds per acre seeded singly or one to two pounds in a mix. Seed sheep fescue about ¼ inch into soil.

SIXWEEKS FESCUE (*Vulpia octaflora* [Walt.] Rydb.)
An annual native fescue indigenous to sagebrush grasslands and prairies in the Intermountain West states, including most of the Great Basin. **Cultivars**: Source-identified sixweeks fescue seed is available in very limited quantities.

TALL FESCUE (*Festuca arundinacea* Schreb.)
A perennial, introduced bunchgrass; broad-leaved, robust fescue adapted for use as domestic livestock forage in irrigated pastures. Tall fescue is suited to irrigated lands with moderately poorly drained conditions or other areas where the effective mean annual precipitation exceeds 18 inches. Tall fescue is tolerant of strongly acidic to strongly alkaline soil conditions. It is most often used for pasture and hayland, high forage

production for livestock. It usually does not go dormant in the summer or in mild winters. *Tall fescue is not recommended for native meadows, prairies, riparian areas, or adjacent to wetlands* since tall fescue is considered to be an *invasive non-native plant in natural areas,* aggressively excludes other desirable species.
Average number of seeds per pound: 225,000. 5.2 seeds/sq.ft./lb/acre. Drill seeding rate: six pounds per acre.

WESTERN FESCUE (*Festuca occidentalis* Hook.)
A tufted, erect, perennial bunchgrass native to the western USA and Canada. Western fescue is found on moist, wooded slopes, stream banks, and lake margins, also in Ponderosa pine and Douglas fir woodlands. It thrives on silt loam to sandy loam soils that receive a minimum of 18 inches of mean annual precipitation. It has good potential for erosion control and soil stabilization seedings. Western fescue is closely related to Idaho fescue. Average number of seeds per pound: 350,000.
Drill seeding rate: eight pounds per acre.

GALLETA GRASS

GALLETA GRASS (*Hilaria jamesii* [Torr.] Benth.)
A tufted, perennial, warm-season grass up to 24 inches tall. Galleta grass is native to the desert shrub lands and grasslands of the central and southern Great Basin areas which receive some summer rainfall. Cultivar/variety: 'Viva' galleta grass was released by the Los Lunas New Mexico Plant Materials Center (USDA, NRCS). Commercial seed is light and fluffy, seed drills need to be set for this type of seed. Average number of seeds per pound: 170,000. 3.9 seeds/sq.ft./lb/acre. Drill seeding rate: seven pounds per acre.

HAIRGRASS

TUFTED HAIRGRASS (*Deschampsia caespitosa* [L.] Beauv.)
A perennial, tussock-forming, native grass found along stream banks, meadows, wetlands, coastal estuaries, bottomlands, and lake and pond margins. Tufted hairgrass' natural range is circumboreal on seasonally wet or hydric soils, extending throughout cooler regions of the Northern Hemisphere where the mean annual precipitation exceeds 40 inches. This grass may naturally occur at elevations from sea level to alpine meadows. Soil: clay loam to silt loam. It is slow to establish, but is long-lived. Potential uses include stream bank and shoreline stabilization, wetland restoration, wildlife habitat and recreation area seedings. There are great genetic and morphological differences in tufted hairgrass ecotypes. The northern Pacific Coast ecotype is often a very robust plant with coarse, broad leaves, with a very high tolerance to ocean salt spray. Whereas, a Rocky Mountain ecotype from an alpine site is usually a small delicate, fine-leaved, low-growing plant, with a very low salt tolerance. About the only characteristics all tufted hairgrass ecotypes have in common are the spikelets are two-seeded, the plants are cespitose with basal leaves, and grow on moist to wet, usually acidic soils. Ecoregions: Pacific Coast Range, Puget Lowland, Willamette Valley, Cascades, Sierra Nevada, Blue Mountains, Northern Rocky Mountains, Middle Rocky Mountains, Idaho Batholith, and Wasatch Mountains. **Cultivars/varieties** of tufted hairgrass include: Tillamook natural

germplasm (USDA-NRCS) originally collected from a coastal estuary near Tillamook, Oregon; Linn natural germplasm (USDA-NRCS) originally collected from a low elevation meadow in the Willamette Valley, Oregon; 'Peru Creek' (EPC, Meeker, Colorado) was selected for use on high elevation sites with very acidic soil conditions; and 'Nortran' (Alaska) was developed from germplasm with origin from Alaska and a non-native European seed source (Iceland).
Average number of seeds per pound: 2,500000. 58seeds/sq.ft./lb/acre.
Drill seeding rate: two pounds per acre; less than 1/8 inch into soil.

JUNEGRASS

PRAIRIE JUNEGRASS (*Koeleria macrantha* [Ledeb.] J.A. Schultes)
A tufted, long-lived perennial, cool season, native bunchgrass; one to two feet in height. Prairie junegrass naturally occurs on moderately deep silt loam to sandy loam soils on prairies, sagebrush-grasslands, and open woodlands in the Pacific Northwest and Intermountain West States. It is rarely found in pure stands, but is very often a component of western prairie and grassland plant communities. Prairie junegrass does best on sites with 11 to 30 inches mean annual precipitation. It is a component of sage-grouse habitat. Ecoregions: Puget Lowlands, Willamette Valley, Columbia Plateau, Blue Mountains, Northern Rocky Mountains, Middle Rocky Mountains, and Wasatch Mountains. **Cultivar/variety:** 'Barkola' was developed in Holland from Eurasian germplasm. Source-identified seed from western USA sources is available in limited quantities.
Average number of seeds per pound: 2,20000. 50seeds/sq.ft./lb/acre.
Drill seeding rate: two pounds per acre; less than 1/8 inch into soil.

MANNAGRASS

MANNAGRASS (*Glyceria* sp. R. Br.)
A genus of annual and perennial grasses found in wetlands and riparian areas including several species native to western USA. Native species include northwestern mannagrass (*Glyceria occidentalis*), northern mannagrass (*G. borealis*), and tall mannagrass (*G. elata*). Mannagrasses are important facultative and obligate wetland plants.

MUHLY GRASS

MUHLY GRASS (*Muhlenbergia* sp. Schreb.)
Several species of Muhly grass (*Muhlenbergia* sp.) are native to the Great Basin region. The species that naturally occur on aridlands in the western USA include scratchgrass (*Muhlenbergia asperifolia* [Nees and Meyen] Parodi) and mat mulhly (*Muhlenbergia richardsonis* [Trin.] Rydb.) Source-identified seed may be commercially available in limited quantities.

NEEDLEGRASS

DESERT NEEDLEGRASS (*Stipa speciosa* Trin. & Rupr.)
A native perennial bunchgrass indigenous to desert shrublands in the Intermountain West states, including most of the central and southern Great Basin region. **Cultivars**: Source-identified seed is available in small quantities.

GREEN NEEDLEGRASS (*Nassella viridula* [Trin.] Barksworth)
A moderately tall (up to three feet tall), cool season, long-lived perennial; native to the northern Great Plains, east of the Rocky Mountains. Green needlegrass is densely tufted with bright green leaves, a deep extensive root system, and regrows in areas that receive summer rainfall. Green needlegrass grows best on clay loam soils and fractured shale soils, and is moderately tolerant of short term flooding. It requires 12 to 30 inches mean annual precipitation; tolerant of moderately alkaline soils derived from calcareous shale; variable tolerance to fire in dormant condition. Ecoregions: Northern Great Plains.
Cultivars/Varieties: 'Lodorm' green needlegrass is a cultivar released by the USDA-NRCS, Bismarck, North Dakota for improved forage and reclamation seedings in the Great Plains, also has lower seed dormancy than other selections. 'Green Stipa' green needlegrass is a cultivar from the Midwestern states.
Average number of seeds per pound: 180,000. 4.1 seeds/sq.ft./lb/acre.
Drill seeding rate: six pounds per acre.

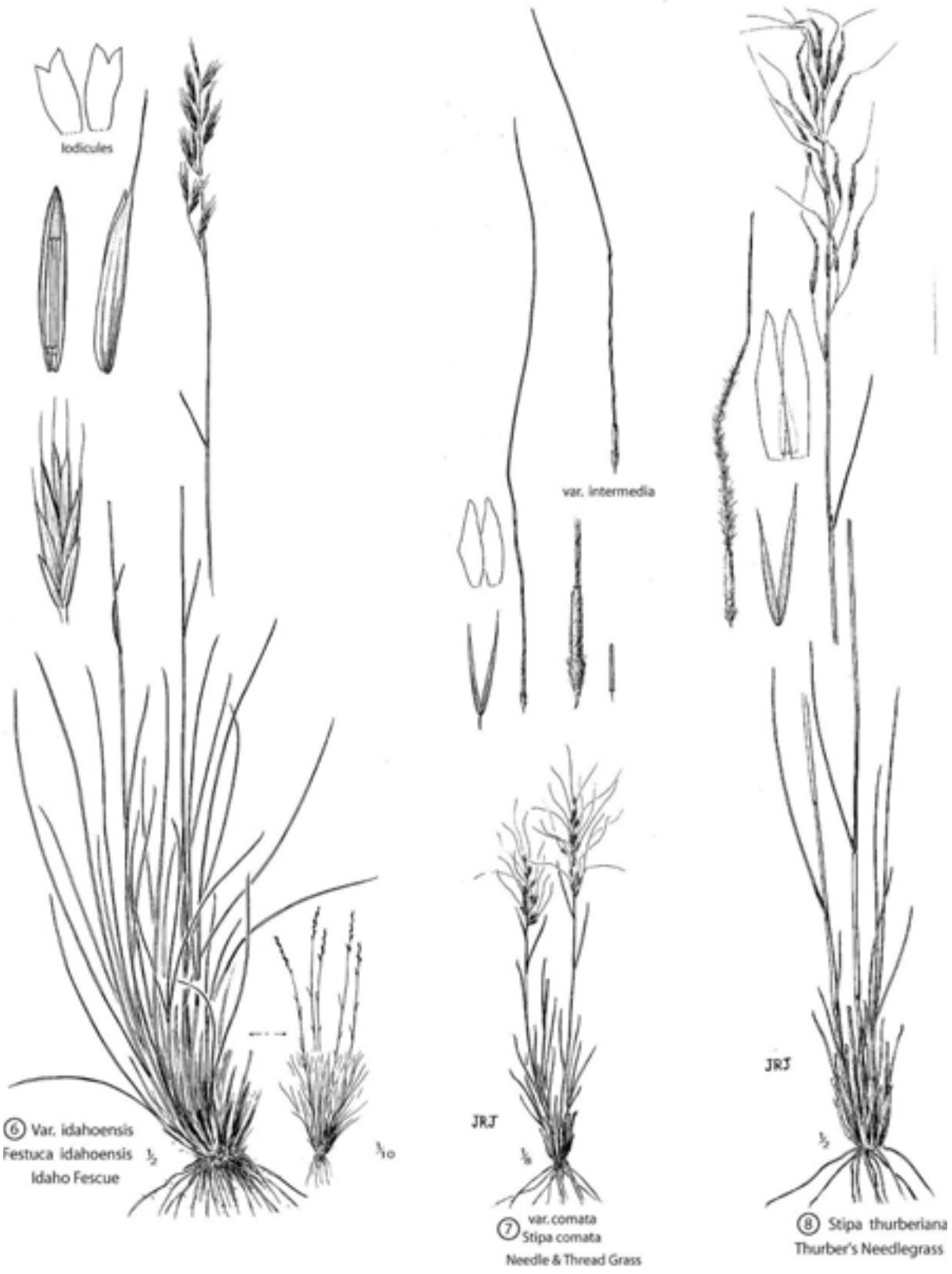
LEMMON'S NEEDLEGRASS (*Stipa lemmonii* [Vasey] Scribn.)
A native perennial species that has a limited distribution in foothill and montane habitat, especially on sandy loam soils in the ponderosa pine regions of southern Oregon to northern California.

NEEDLE and THREAD GRASS [#7] (*Stipa comata* Trin. & Rupr.)
A native, cool season, tufted, perennial bunchgrass widespread on sands to sandy loam soils in the western states, including most of the Great Basin. Needle and thread is one to three feet in height. A notable characteristic of needle and thread is the seed has a very long (five to eight inches), barb tipped awn. It is a component of sage-grouse habitat.
Ecoregions: Columbia Plateau, Eastern Cascades, Snake River Plain, Klamath Mountains, Northern Basin and Range, Central Basin and Range. **No cultivars** are available at this time, but source-identified seed is collected and available from commercial vendors.
Average number of seeds per pound: 150,000. 3.4 seeds/sq ft/lb/acre.
Drill seeding rate: six pounds per acre for single species or one to two lbs. in a seed mix.

THURBER'S NEEDLEGRASS [#8] (*Stipa thurberiana* Piper)
A native, perennial, cool season bunchgrass, short to medium tall (12 to 24 inches). Thurber's needlegrass is indigenous to sagebrush grasslands in Oregon, Idaho, Washington, Nevada, California, Wyoming and Montana on sandy loam to rocky, shallow soils that receive six to 14 inches mean annual precipitation. It is an important component of sage-grouse habitat. Thurber's needlegrass is found in the following **ecoregions**: Columbia Plateau, Blue Mountains, Snake River Plain, and Northern Basin and Range.
Cultivars/Varieties: Orchard selection of Thurber's needlegrass was originally collected from a Wyoming big sagebrush/bunchgrass community near Orchard, Idaho; the US

Forest Service Shrub Sciences Lab has provided seed to seed growers for field production. Source-identified seed may be available in limited quantities from commercial seed vendors.
Average number of seeds per pound: estimated at 150,000 seeds. 3.4 seeds/sq.ft./lb/acre.
Drill seeding rate: six pounds per acre, seed about ¼ to ½ inch into soil.

WESTERN NEEDLEGRASS (*Stipa occidentalis* Thurb. ex S. Wats.)
A native perennial bunchgrass indigenous to sagebrush steppe, grasslands and subalpine ridges in the western USA. Western needlegrass is similar in characteristics to Letterman's needlegrass (*Stipa lettermannii* Vasey) that naturally occurs in the same western states on sagebrush hills, benchland and subalpine ridges.


lodicules
⑥ Var. idahoensis
Festuca idahoensis
Idaho Fescue
var. intermedia
JRJ
⑦ var. comata
Stipa comata
Needle & Thread Grass
JRJ
⑧ Stipa thurberiana
Thurber's Needlegrass

OATGRASS

CALIFORNIA OATGRASS (*Danthonia californica* Boland.)
A native perennial bunchgrass indigenous to the western USA and Canada in meadows, woodlands, hillsides, grasslands, coastal prairies, and along rocky mountain ridges. California oatgrass naturally occurs from sea level to over 5,000 feet in elevation. It is found on loam, silt loam, clay loam and serpentine or granitic-derived soils with 18 to 45 inches mean annual precipitation. It has moderate annual herbage production, easily overgrazed by domestic livestock, and usually low annual seed production. Ecoregions: Pacific Coast Range, Willamette Valley, Puget Lowlands, Columbia Plateau, Blue Mountains, Eastern Cascades, and Klamath Mountains. **Cultivars/Varieties**: Baskett Slough California oatgrass is a native germplasm selection released by USDA-NRCS, Corvallis, Oregon; the seed was originally collected from natural prairie in the Willamette Valley, Oregon. Seeding rate eight pounds per acre.

Other species of Danthonia native to the western USA include: one-spike oatgrass (*Danthonia unispicata* [Thurb.] Monroe ex Macoun), timber oatgrass (*Danthonia intermedia* Vasey), and Parry's oatgrass (*Danthonia parryi* Scribn.).

ORCHARDGRASS

ORCHARDGRASS [#9] (*Dactylis glomerata* L.)
A long-lived, introduced bunchgrass adapted to well-drained loam to silt loam soils where the mean annual precipitation exceeds 16 inches. Orchardgrass has high annual forage production; it is suited to pasture, hay, silage and erosion control. It is shade tolerant and can be grown on irrigated land or dryland where the effective moisture is greater than 16 inches per year. Cultivars are rated as to forage maturity: early, mid-season and late season. Late season orchardgrass varieties are used in pasture mixtures with alfalfa. **Cultivars/Varieties** of Orchardgrass used in the western states include: Early season forage: 'Hallmark', 'Potomac', and 'Sterling'. Mid-season forage: 'Napier', 'Paiute', 'Pennmead', and Akaroa'. Late season forage: 'Latar' and 'Pennlate'.
Average number of seeds per pound: 450000. 10.5 seeds/sq.ft./lb/acre.
Drill seeding rate: six pounds per acre usually seeded with alfalfa or similar legume.

PINEGRASS

BLUEJOINT REEDGRASS (*Calamagrostis canadensis* [Michx.] Beauv.)
A widespread native perennial grass commonly found in northern USA and Canada in marshes, mountain meadows, parklands, and subalpine areas, usually found on hydric soils. Reedgrass requires at least 24 inches of mean annual precipitation to establish. No commercial cultivar of any *Calamagrostis* species is available.

PINEGRASS (*Calamagrostis rubescens* Buckl.)
A perennial, moderately tall (24 to 40 inches), grass; culms in tufts, with rhizomes. Pinegrass is native to coniferous forests in the western USA, it naturally occurs from middle elevations to alpine zones in Cascade and Rocky Mountains. It makes a strong turf which resists heavy grazing and trampling; usually low seed production.

RICEGRASS

INDIAN RICEGRASS [#10] (*Oryzopsis hymenoides* [Roemer & J.A. Schultes] Ricker ex Piper)
A cool season, drought tolerant, perennial native bunchgrass commonly found on sands to sandy loam, aridic, soils in western USA; requires six to sixteen inches mean annual precipitation. It is tolerant of weak salinity and alkalinity, intolerant of shade. Indian ricegrass has good tolerance to fire when dormant. The seed has a very high protein and fat content, edible to humans as well as animals. Indian ricegrass has an indeterminate flowering habitat which causes seed maturation throughout the growing season. Seed of Indian ricegrass may stay dormant for two-three years after seeding. Seed may be scarified just prior to seed to speed up the germination process. It is a component of sage-grouse habitat. Ecoregions: Columbia Plateau, Eastern Cascades, Snake River Plain, Blue Mountains, and Northern Basin and Range. **Cultivars/Varieties**: 'Nezpar' Indian ricegrass was released by the USDA-NRCS, Aberdeen, Idaho for superior germination and seedling vigor for use in the Intermountain West. 'Paloma' released by USDA-NRCS, Los Lunas, New Mexico for use in the southwestern states. 'Rimrock' Indian ricegrass was released by USDA-ARS and NRCS in Montana is from a seed source in southern Alberta, Canada; it is intended for central and northern areas or higher elevations in the foothills and mountains.
Average number of seeds per pound: 205,000. 4.7 seeds/sq.ft./lb/acre.
Drill seeding rate: five pounds per acre; seeding depth of two to four inches in coarse sandy soil, one to three inches in silt loam or sandy loam soils.

RYEGRASS

ANNUAL RYEGRASS (*Lolium perenne* ssp. *multiflorum* [Lam.] Husnot)
A vigorous, winter-active annual grass adapted to wide range of soil and moisture conditions. Annual ryegrass can be grown under irrigation or on dryland where the effective mean annual precipitation is at least 15 inches. It has been seeded as winter cover crop, temporary cover or for erosion control on construction site and other disturbed areas. Annual ryegrass has a rapid rate of establishment from seed. It is very competitive with other herbaceous plants and retards establishment of perennial grasses and forbs if it is seeded at high rate in seed mixtures. *Annual ryegrass may be considered to be an invasive non-native plant when seeded in natural areas or with native plants.* Several commercial cultivars are available. Annual ryegrass usually acts as a perennial grass west of the Cascade Mountains, but is not cold hardy, and is annual grass in the interior western regions. Drill seeding rate for erosion control: three pounds per acre in a seed mixture.

Dactylis glomerata
⑨ Orchardgrass

⑩ Oryzopsis hymenoides
Indian Ricegrass

PERENNIAL RYEGRASS (*Lolium perenne* ssp. *perenne* L.)
A relative short-lived, rapidly developing, vigorous bunchgrass adapted to a wide variety of soil conditions in the western USA. Perennial ryegrass can be grown under irrigation or other land where the effective annual precipitation exceeds fifteen inches. It has been used in grass-legume mixes for forage, and seeded singly for turf grass and erosion control. It retards the establishment of other perennials if seeded heavily in a mixture. *Perennial ryegrass may be considered to be an invasive non-native plant when seeded in natural areas or with native plants.* Turf varieties have been inoculated with an endophyte fungus for improved plant health; forage varieties do not have the endophyte fungus. Drill seeding rate for erosion control: three pounds per acre in a seed mixture.

TETRAPLOID RYEGRASS (*Lolium* X L.)
A perennial, hybrid ryegrass very similar in performance to perennial ryegrass with improved seedling vigor. Tetraploid ryegrass has been used with other forage grasses and legumes for pasture. *It is considered to be an invasive non-native plant in natural areas.* Seeding rate for erosion control: three pounds per acre in a seed mixture.

SALTGRASS

INLAND SALTGRASS (*Distichlis spicata* [L.] Greene)
A native, perennial, rhizomatous grass commonly found on alkaline and saline soils in the western USA. Inland saltgrass often occurs in plant associations with greasewood (*Sarcobatus vermiculatus*) and alkali sacaton (*Sporobolus airoides*). It is propagated by seed, but may be reproduced by vegetative tillers. Ecoregions: Pacific Coast Range, Eastern Cascades, Columbia Plateau, Snake River Plain, Northern Basin and Range. Average number of seeds per pound: 520,000. 11.9 seeds/sq.ft./lb/acre.

SQUIRRELTAIL

BIG SQUIRRELTAIL (*Elymus multisetus* [J.G. Smith] Burtt-Davey)
A drought tolerant, cool season, native perennial bunchgrass found on aridlands in the Great Basin states of Idaho, Utah, Oregon, and Nevada where the mean annual precipitation is six to 14 inches. Soils: usually occurs on silt loam to sandy loam. Big squirreltail has similar morphological characteristics as bottlebrush squirreltail but is a moderately tall, tufted bunchgrass up to 36 inches in height. It was previously identified as *Elymus elymoides* (*Sitanion hystrix*). Ecoregions: Snake River Plains and Northern Basin and Range. **Cultivars/Varieties**: One selected native germplasm has been released by USDA-ARS, Logan, Utah: Sand Hollow big squirreltail, native source in Gem County, Idaho. Drill seeding rate: six pounds per acre.

BOTTLEBRUSH SQUIRRELTAIL [#11] (*Elymus elymoides* [Raf.] Swezey)
A drought-tolerant, cool season, native, perennial bunchgrass. Bottlebrush (former species name is *Sitanion hystrix*) is widespread in the interior regions of the western North America at mid to high elevation sites that receive six to 14 inches of mean annual precipitation. It is a short to medium size (12 to 26 inches tall), tufted bunchgrass, seed

with awns, greens up early in spring with moderate herbage production, dormant by early summer. It is a component of sage-grouse habitat. Several subspecies of squirreltail have been identified recently. Soils: sandy loam to silt loam. Ecoregions: Cascades, Eastern Cascades, Columbia Plateau, Snake River Plain, and Northern Basin and Range. Average number of seeds per pound: 190,000. 4.4 seeds/sq.ft./lb/acre. Drill seeding rate: six pounds per acre. **Cultivars/Varieties**: Two selected native germplasms released by USDA-ARS, Logan, Utah are Fish Creek bottlebrush squirreltail (*Elymus elymoides* ssp. *elymoides*), native source Blaine County, Idaho and Toe Jam Creek bottlebrush squirreltail (*Elymus elymoides* ssp. *californicus*), native source Elko County, Nevada. Other source-identified native squirreltail seed is available including: Mountain Home squirreltail germplasm, in an ARS research study, potential as a drought tolerant, lower elevation squirreltail seed for aridlands in the Northern Basin and Range.


var. hystrix
lodicules
var. brevifolium
var. hordeoides
JRJ
Elymus elymoides (11)
Bottlebrush, Squirreltail